

Notice of Allowability

Application No.

09/724,025

Applicant(s)

HERRING ET AL.

Examiner

Shannon S. Saliard

Art Unit

3628

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 8/23/07.
2. ☒ The allowed claim(s) is/are 1-4,6-8,10-17,19-29,62,63 and 65-69.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____ |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____ |

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Timothy Bechen on 19 November 2007.

The application has been amended as follows:

1.(Currently Amended) A method for analyzing a potential cause of a change in a service, wherein service quality of the service is monitored, usage of the service is measured, and service events are detected, the method comprising:
determining a service change time window based at least in part upon a change in service quality between a first working state and a second, non-working state, and upon a change in service usage amount, the service change time window encompassing at least part of a service outage;
retrieving data representing a plurality of detected events and a-corresponding times in which the events occurred;
computing a probability for each of the detected events that each of the detected events caused the service change based at least in part on a correlation between the event time and the service change time window;

determining whether one or more other events of a type identical to one of the detected events occurred; and

wherein computing the probability comprises computing the probability using at least in part a false occurrence weighting function which decreases the probability of the detected event as the cause of the service change for instances in which the detected event occurred outside the service change time window.

2. (Original) The method of claim 1, wherein determining the service change time window comprises determining a service failure time window based upon the change in service quality and narrowing the service failure time window to the service change time window based upon the service usage amount measured during that service failure time window.

3. (Original) The method of claim 2, wherein the service quality is monitored through periodic polling of the service quality, and comprising determining the service failure time window as bounded by a polled point of the first working state and a polled point of the second, non-working state.

4. (Original) The method of claim 1, wherein computing the probability comprises computing the probability using at least in part a time weighting function which decreases exponentially with the distance between the event time and the service change time window.

5. (Cancelled)

6. (Previously Amended) The method of claim 1, comprising storing historical data associating occurrences of prior events with prior service changes, and wherein computing the probability that one of the detected events caused the service change comprises computing the probability based at least in part on the historical data.

7. (Original) The method of claim 6, wherein storing historical data comprises storing data representing instances in which prior events occurred within prior service change time windows, and wherein computing the probability that the detected event caused the service change comprises using at least in part a positive occurrence weighting function which increases the probability of the detected event as the cause of the service change based on instances in the historical data in which a prior event of a type identical to the detected event occurred within a prior service change time window.

8. (Original) The method of claim 6, wherein storing historical data comprises storing data representing instances in which prior events were identified as having caused prior service changes, and wherein computing the probability that the detected event caused the service change comprises using at least in part a historical weighting function which increases the probability of the detected event as the cause of the service change based on instances in the historical data in which a prior event of a type identical to the

detected event was identified as
having caused a prior service change.

9. (Cancelled)

10. (Currently Amended) The method of claim 1, wherein computing probabilities comprises computing the probabilities such that the total of all computed probabilities is 1.

11. (Currently Amended) The method of claim 1, wherein the service comprises service over a communication network and wherein the detected events include a network event.

12. (Currently Amended) The method of claim 1, wherein the service comprises service provided by an application program and wherein the detected events include comprises an application program event.

13. (Original) The method of claim 1, wherein the service change is a service outage, comprising determining the service change time window as a change in service quality from the first working state to the second, non-working state.

14 (Original) The method of claim 1, wherein the service change is a service recovery, comprising determining the service change time window as a change in service quality from the second, non-working state to the first, working state.

15 (Original) The method of claim 1, wherein determining the service change time window comprises detecting a change in service quality by detecting a step change in measured usage.

16 (Currently Amended) A method for analyzing potential causes of a service change, the method comprising:

determining a service change time window encompassing a change of service between a first working state and a service outage, the service change being determined at least in part based on measured service usage levels;

detecting occurrences of a set of events; retrieving data representing the plurality of detected events and corresponding times in which the events occurred, wherein the set of events are within a given time prior to and during the service change time window,

each occurrence of an event being associated with a time at which the event occurred;

computing a probability distribution for the set of events, which probability distribution determines for each event in the set the probability that the detected event caused the service change, the probability distribution being based at least in part on relations

between the time of each event occurrence and the service change time window; and

wherein computing the probability includes using two or more second functions selected from the group consisting of:

a time weighting function which decreases exponentially the probability of a given event as the cause of the service change with the distance between the given event time and the service change time window;

a false occurrence weighting function which decreases the probability of a given event as the cause of the service change for instances in which events of the same type as the given event occurred outside the service change time window;

a positive occurrence weighting function which increases the probability of a given event as the cause of the service change based on instances stored in a historical database in which events of the same type as the given event occurred within a prior service change time window; and

a historical weighting function which increases the probability of a given event as the cause of the service change based on instances in the historical database in which events of the same type as the given event were identified as having caused a prior service outage.

17. (Original) The method of claim 16, wherein computing the probability distribution for the set of events comprises computing the probability distribution using a first weighting function which is the product of two or more second weighting functions.

18. (Cancelled)

19. (Original) The method of claim 18, wherein the step of computing the probability distribution comprises using a first weighting function which is the product of the time weighting function, false occurrence weighting function, positive occurrence weighting function, and user weighting function.

20. (Original) The method of claim 16, comprising monitoring service quality, and wherein determining the service change time window comprises determining a service failure time window based upon a change in monitored service quality and narrowing the service failure time window to the service change time window based upon the service usage amount measured during that service failure time window.

21. (Original) The method of claim 20, wherein the service quality is monitored through periodic polling of the service quality, and comprising determining the service failure time window as bounded by a polled point of the first working state and a polled point of the second, non-working state.

22. (Original) The method of claim 16, comprising computing the probability distribution such that the total of all probabilities in the distribution is 1.

23. (Original) The method of claim 16, wherein the service comprises service over a communication network and wherein the detected events comprise network events.

24 (Original) The method of claim 16, wherein the service comprises service provided by an application program and wherein the detected events comprise application program events.

25 (Original) The method of claim 16, wherein the service change is a service outage, comprising determining the service change time window as a change in service from the first working state to the second, non-working state.

26 (Original) The method of claim 16, wherein the service change is a service recovery, comprising determining the service change time window as a change in service from the second, non-working state to the first, working state.

27 (Previously Presented) The method of claim 16, wherein determining the service change time window comprises detecting a step change in measured usage.

28 (Currently Amended) A network monitoring system comprising: a service monitor for monitoring quality of service on the network; a usage meter for measuring usage of the network;

an event detector for detecting a plurality of network events and corresponding times at

which the network events occur; and

a probable cause engine, coupled to receive data from the service monitor, usage meter, and the event detector, the probable cause engine including a processing device that, in response to executable instructions, is operative to:

set setting a service change time window based upon data received from the service monitor or usage meter, the service change time window encompassing at least part of an occurrence of a service outage in the network;

determine determining which of the network events detected by the event detector is the most likely cause of a service change including computing a probability for each of the detected events that each of the detected events caused the service change based at least in part on a correlation between the event time and service change time window; determining whether one or more other events of a type identical to one of the detected events occurred; and

wherein computing the probability comprises computing the probability using at least in part a false occurrence weighting function which decreases the probability of the detected event as the cause of the service change for instances in which the detected event occurred outside the service change time window.

29. (Currently Amended) A computer readable medium storing program code for, when executed, causing a computer to perform a method for analyzing a potential cause of a change in a service, wherein service quality of the service is monitored, usage amount of the service is measured, and service events are detected, the method

comprising:

determining a service change time window based at least in part upon a change in service quality between a first working state and a second, non-working state, and upon a change in service usage amount, the service change time window encompassing at least part of a service outage;

retrieving data representing a plurality of detected events and a-corresponding times in which the events occurred;

computing a probability for each of the detected events that each of the detected events caused the service change based at least in part on a correlation between the event time and the service change time window;

determining whether one or more other events of a type identical to one of the detected events occurred; and

wherein computing the probability comprises computing the probability using at least in part a false occurrence weighting function which decreases the probability of the detected event as the cause of the service change for instances in which the detected event occurred outside the service change time window.

30. - 61. (Cancelled)

62. (Currently amended) Computer readable media comprising program code that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change,

the method comprising:

determining a service change time window encompassing a change of service between a first working state and a service outage, the service change being determined at least in part based on measured service usage levels;

detecting occurrences of a set of events; retrieving data representing the plurality of detected events and corresponding times in which the events occurred, wherein the set of events are within a given time prior to and during the service change time window, each occurrence of an event being associated with a time at which the event occurred; computing a probability distribution for the set of events, which probability distribution determines for each event in the set the probability that the detected event caused the service change, the probability distribution being based at least in part on relations between the time of each event occurrence and the service change window;

wherein computing the probability includes using two or more second functions selected from the group consisting of:

a time weighting function which decreases the probability of a given event

as the cause of the service change with the distance between the given event time and the service change time window;

a false occurrence weighting function which decreases the probability of a given event as the cause of the service change for instances in which events of the same type as the given event occurred outside the service change time window;

a positive occurrence weighting function which increases the probability of a given event as the cause of the service change based on instances stored in a historical database in

which events of the same type as the given event occurred within a prior service change time window; and
a historical weighting function which increases the probability of a given event as the cause of the service change based on instances in the historical database in which events of the same type as the given event were identified as having caused a prior service outage.

63. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, wherein computing the probability distribution for the set of event comprises computing the probability distribution using a first weighting function which is the product of two or more second weighting functions.

64. (Cancelled)

65. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, the method comprising monitoring service quality, an wherein determining the service change time window comprises determining a service failure

time window based upon a change in monitored service quality and narrowing the service failure time window to the service change time window based upon the service usage amount measured during the service failure time window.

66. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, the method comprising computing the probability distribution such that the total of all probabilities in the distribution is 1.

67. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, wherein the service comprises service over a communication network and wherein the detected events comprise network events.

68. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, wherein the service comprises service provided by an application program and wherein the detected events comprise application program events.

69. (Previously presented) The computer readable media comprising program code of claim 62 that, when executed by a programmable microprocessor, causes the programmable microprocessor to execute a method for analyzing potential cause of a service change, wherein the service change is a service outage, comprising determining the service change time window as a change in service from the first working state to the second, non-working state.

70. -- 77. (Cancelled)

Allowable Subject Matter

2. The following is an examiner's statement of reasons for allowance: see Office Action dated 30 May 2007.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shannon S. Saliard whose telephone number is 571-272-5587. The examiner can normally be reached on Monday - Friday, 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John W. Hayes can be reached on 571-272-6708. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Please address mail to be delivered by the United States Postal Service (USPS) as follows:

***Commissioner of Patents and Trademarks
Washington, D.C. 20231***

Or faxed to:

(571) 273-5587 [Informal/ Draft Communications, labeled
"PROPOSED" or "DRAFT"]

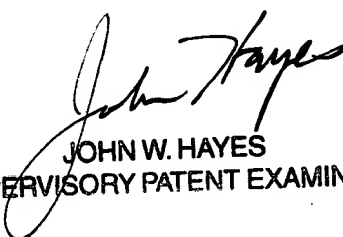
Application/Control Number:
09/724,025
Art Unit: 3628

Page 17

Hand delivered responses should be brought to the Customer Service Window,
Randolph Building, 401 Dulany Street, Alexandria, VA 22314

Shannon S Saliard
Examiner
Art Unit 3628

sss


JOHN W. HAYES
SUPERVISORY PATENT EXAMINER